

# CLUTCH

A single-plate dry disc type clutch is used in all models. There is no adjustment for wear provided in the clutch itself; the clutch pedal travel is adjustable to compensate for lining wear.

On all models except the Goldenhawk, an individual adjustment is provided for each release lever, but this should never be disturbed unless the clutch is disassembled for replacement of parts. The pressure plate assembly of the Goldenhawk is serviced only as an assembly. A prelubricated ball-type clutch release bearing is used on all models.

An Oilite pilot bearing is used on all models, except the Goldenhawk. On the Commander, President, Powerhawk, and Skyhawk it is located in the end of the crankshaft, and on the Champion and Flighthawk, it is located in the flywheel. On the Goldenhawk, the pilot bearing is of the ball-type and is located in the end of the crankshaft.

On all models except the Goldenhawk, the right-hand side of the clutch release shaft is prepacked with a high-melting point lubricant at time of installation; whereas the left-hand side is lubricated with chassis lubricant by means of a zerk fitting which is located in the shaft retainer. A rubber ring grease seal is used in the retainer to prevent lubricant from entering the housing.

## Specifications

	FLIGHTHAWK, CHAMPION	POWERHAWK, COMMANDER	SKYHAWK, PRESIDENT	GOLDENHAWK
Make .....	Borg & Beck	Borg & Beck	Borg & Beck	Long
Vibration damper .....	Yes	Yes	Yes	Yes
Clutch driven discs .....	1	1	1	1
Clutch facings .....	Composition	Composition	Composition	Woven Asbestos
Facing inside diameter .....	6 $\frac{1}{8}$ " (155,6 mm.)	6" (152,4 mm.)	6 $\frac{1}{2}$ " (165,1 mm.)	7" (177,8 mm.)
Facing outside diameter .....	9 $\frac{1}{4}$ " (231,8 mm.)	10" (254,0 mm.)	10 $\frac{1}{4}$ " (260,4 mm.)	11" (279,4 mm.)
Facing thickness .....	.125" (3,175 mm.)	.125" (3,175 mm.)	.125" (3,175 mm.)	.125" (3,175 mm.)
Facings required .....	2	2	2	2
Pedal free play .....	1" (25,50 mm.)	1" (25,50 mm.)	1" (25,50 mm.)	1 $\frac{1}{2}$ " (38,1 mm.)
Clutch spring pressure .....	1170	1500	1734	1467
Number of springs .....	6	9	9	8

### CLUTCH OR BELL HOUSING

#### Removal—All Models (Except Goldenhawk)

Disconnect the battery ground strap. On the Champion and Flighthawk remove the oil level gauge and tube, remove the starter mounting cap screws, remove the starter without disconnecting the cables and tie it in an out-of-the-way position. On the Commander, President, Powerhawk and Skyhawk, remove the starter as outlined in the Electrical System section.

Remove the clutch operating shaft as outlined under Clutch Operating Shaft. Remove the transmission as outlined in the Transmission section.

Remove the two bolts which hold the engine rear support insulator cage to the crossmember. Place a small hydraulic jack at the rear of the oil pan and insert a block of wood between the jack pad and oil pan to prevent damaging the pan. Raise the engine just enough to take the weight of the engine off the crossmember. Remove the support crossmember-to-frame bolts and remove the crossmember.

Remove the two clutch housing bolts which hold the exhaust pipe support bracket. Loosen the clamp bolt and swing the support bracket out of the way.

On the Commander, President, Powerhawk, and Skyhawk, remove the clutch housing cover plate.

Remove the remaining housing mounting bolts or cap screws and remove the clutch housing. On the Champion and Flighthawk, remove the dowel bolts first.

#### Reinstallation—All Models (Except Goldenhawk)

Assemble the clutch housing on the engine. On the Champion and Flighthawk, temporarily align the clutch housing to the engine rear support plate by means of two tapered drifts; then install the dowel bolts. Draw the dowel bolts in place by tightening the nuts; do not drive them into place. On the Commander, President, Powerhawk, and Skyhawk, install the clutch housing cover plate. Install all of the housing bolts except the two housing-to-exhaust pipe support bracket bolts. Swing the exhaust pipe support bracket into position on the engine rear support plate or clutch housing cover plate and install the retaining bolts. Shim the bracket, if necessary, to avoid overstressing the exhaust pipe flange.

Tighten the clamp bolt. Align the mounting holes of the support crossmember to the frame, install the retaining bolts and tighten securely. Lower the hydraulic jack slowly, making sure that the rear support insulator cage is properly seated. Install the bolts which hold the insulator cage to the support crossmember and tighten securely.

Install the transmission as outlined in the Transmission section. Install the clutch operating shaft as outlined under Clutch Operating Shaft. On the Champion and Flighthawk, install the starter and the oil level gauge and tube. On the Commander, President, Powerhawk, and Skyhawk, install the starter as outlined in the Electrical System section. Connect the battery ground strap.

### Removal—Goldenhawk

Disconnect the clutch adjusting rod from the release bearing lever. Remove the operating shaft support bracket-to-transmission screws, swing the bracket down and slip the bracket and ball stud out of the operating shaft. Disconnect the shift rods from the shift levers. Disconnect the propeller shaft from the transmission. Disconnect the overdrive wiring and control cable.

Use a jack or suitable equipment to support the engine. Then remove the engine rear support mounting bolts. Remove the support crossmembers.

The bellhousing and release bearing are removed with the transmission to prevent damage to the release bearing pull-back spring.

Remove the cap screws which attach the bellhousing to the flywheel housing and remove the housing and transmission as an assembly.

Disconnect the release lever pull-back spring and remove the release bearing from the transmission front flange. Then remove the transmission screws and remove the housing.

### Installation—Goldenhawk

Install the housing on the transmission, at the same time slip the release bearing on the transmission front flange. Install the release lever pull-back spring.

Position the transmission and housing on the flywheel housing, making sure that the transmission pinion shaft does not rest on, bend or dish the clutch plate during the installation. Install the housing retaining screws.

Install the crossmembers and install the engine rear support bolts. Then remove the jack.

Connect the clutch adjusting rod to the release bearing lever. Make sure that the spring, spacer, and felt are properly positioned within the end of the operating shaft. Slip the operating shaft ball stud into the shaft and position the bracket on the transmission. Connect the shift rods. Connect the propeller shaft to the transmission flange. Connect the overdrive wiring and control cable.

Adjust the clutch pedal free travel.

## NEW HOUSING INSTALLATION— Champion and Flighthawk

The bore and face runout of the new housing must be checked and the housing properly aligned with the engine. Then the housing must be doweled when installed so the alignment will be maintained.

Install the new clutch housing and install all of the cap screws and bolts in all but the two side holes which are to be used as new dowel holes (see Fig. 1). Then tighten the bolts and cap screws sufficiently to hold the housing in place.

Install the Clutch Aligning Gauge J-2045 and a dial test indicator and check the bore and face runout as outlined under Clutch Housing—Alignment. If the face runout exceeds .006" (0.15 mm.), the housing cannot be used. If the bore runout exceeds .004" (0.10 mm.), use a lead hammer and shift the housing until the runout is within limits. Then tighten all the cap screws and bolts securely and recheck the bore runout.

Using a  $\frac{3}{8}$ " (9.525 mm.) drill, enlarge the two holes to be used as new dowel positions (See Fig. 1, Sec. A-A). Ream the holes to .3900" to .3905" (9.906 mm. to 9.9186 mm.). Insert the original dowel bolts in the new dowel holes.

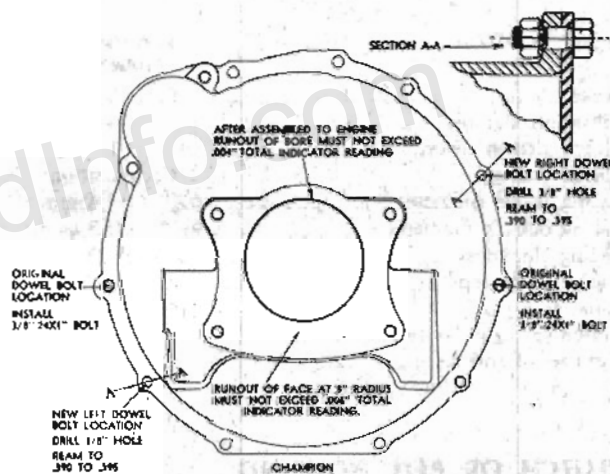


FIG. 1

## NEW HOUSING INSTALLATION— Commander, President, Powerhawk and Skyhawk

Install the new clutch housing on the original dowel pins. Install all of the cap screws and tighten securely. Then, using the Clutch Aligning Gauge J-2045 and a dial test indicator, check the bore and face runout as outlined under Clutch Housing—Checking Alignment. If the face runout exceeds .006" (0.15 mm.) at a  $4\frac{1}{2}$ " (11.4 cm.) radius, the housing cannot be used.

If the bore runout exceeds .004" (0.10 mm.), remove the housing and drive out the original dowel pins. Assemble the housing on the engine, but tighten the cap screws only enough to hold the housing in place against the engine block. Again check the bore



runout. Then, using a lead hammer, shift the housing until the bore runout is within limits. Tighten the cap screws and recheck the runout. To maintain the alignment, use an  $11/32$ " drill and drill two new dowel holes in approximate locations as shown in Fig. 2. Ream the holes to  $.376$ " to  $.377$ " (9,55 mm. to 9,58 mm.). Then install the dowel pins in the new dowel holes.

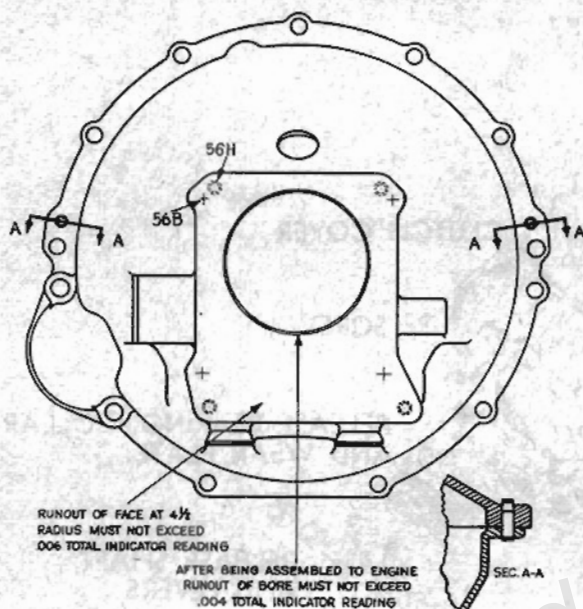


FIG. 2

### HOUSING ALIGNMENT

#### Checking—All Models (Except Goldenhawk)

To check the clutch housing alignment, bore, and face runout, install the Clutch Aligning Gauge J-2045 in the pilot bearing, making sure that the gauge is centered and locked securely. Then assemble a dial test indicator on the aligning gauge.

Set the dial test indicator in the bore and, by revolving the crankshaft slowly, check the total reading on the indicator. The bore runout must not exceed  $.004$ " (0,10 mm.). If the runout exceeds this limit, the housing must be repositioned and the dowels relocated as outlined under Clutch Housing—Installation of new housing.

To check the face runout of the housing, set the dial test indicator on the face at a  $3$ " (76,2 mm.) radius on Champion and Flighthawk models, and at  $4\frac{1}{2}$ " (11,4 cm.) radius on all other models. Then by revolving the crankshaft, the runout must be within  $.006$ " (0,15 mm.) total indicator reading. If the runout exceeds  $.006$ ", the housing must be replaced.

#### Checking—Goldenhawk

Install a dial indicator, with the bracket attached to one of the flywheel cap screws. Adjust the bracket

so that the indicator plunger is against the flat-milled surface at the rear end of the bellhousing. Rotate the engine crankshaft until the indicator circles the bellhousing and check the indicator reading. The runout should not exceed  $.003$ " (0,076 mm.) total indicator reading. If the reading is out of limits, check for dirt between the mating surfaces of the bellhousing and flywheel housing. If cleaning the mating surfaces does not correct the condition, replace the housing.

Check the bellhousing bore runout in the same manner; but place the indicator so that plunger rests on the inside of the bore. The runout must not exceed  $.005$ " (0,13 mm.) total indicator reading. If reading is out of limits, replace the housing.

To align the converter housing, if the bore runout is out of limits, first remove the housing and remove the dowel pins. Then install the housing, tightening the bolts only enough to hold the housing in place. Install the clutch aligning gauge and dial test indicator and, while taking the runout reading, use a lead hammer to shift the converter housing until the reading is within limits. Then tighten all bolts and cap screws securely and recheck the runout by revolving the crankshaft at least one complete turn.

Drill an  $11/32$ " (8,73 mm.) hole near each production dowel hole through the thin section of the flange. Ream the hole to  $.376$ " to  $.377$ " (9,55 mm. to 9,58 mm.). Install the special tapered dowels from the front side of the plate and drive the dowels in until the front side of the dowel is flush with the front face of the engine plate.

### TORQUE CONVERTER HOUSING

#### Alignment—All Models (Except Goldenhawk)

When installing a torque converter housing, the bore and face runout must be checked and the housing put in proper alignment with the engine. The torque converter must be removed while making the alignment check.

Install the housing on the dowels and tighten the cap screws and bolts. Install the Clutch Aligning Gauge J-2045 in the end of the crankshaft, making sure that the gauge is centered and locked securely. Assemble the dial test indicator on the aligning gauge.

Set the dial test indicator on the face of the housing at a  $3\frac{1}{2}$ " (88,9 mm.) radius. Revolve the crankshaft and check the total indicator reading. The reading must not exceed  $.006$ " (0,15 mm.) total indicator reading. If the face runout exceeds  $.006$ " (0,15 mm.), the housing must be replaced.

Set the dial test indicator in the bore and, by revolving the crankshaft slowly, check the total reading on the indicator. The bore runout must not exceed  $.004$ " (0,10 mm.) total indicator reading. If the runout is not within limits, the housing must be repositioned and the dowels relocated.

## CLUTCH ASSEMBLY

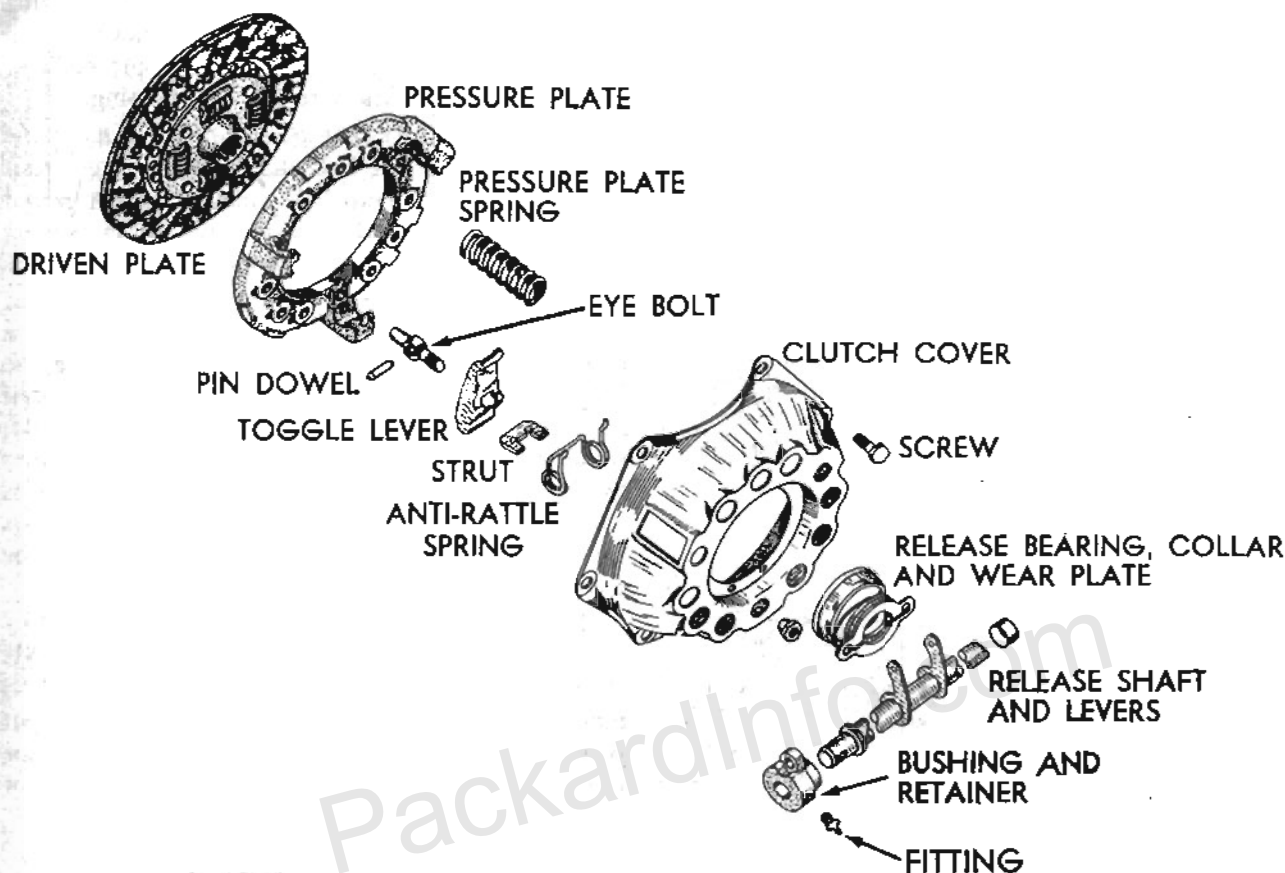


FIG. 3

### PRESSURE PLATE ASSEMBLY

Borg and Beck pressure plate assemblies are used in all models except the Goldenhawk. They are alike in construction and operation, but differ in size as to various models. The Long pressure plate is used in Goldenhawk models. This unit should not be disassembled but serviced only as an assembly.

#### Removal—All Models

Remove the clutch housing as outlined under Clutch Housing—Removal.

Remove the cover retaining screws, alternately, backing off the screws until the spring pressure is released, to avoid distorting the cover. Remove the clutch pressure plate assembly and driven plate.

#### Disassembly—All Models (Except Goldenhawk)

Place the pressure plate assembly in an arbor press and insert a block of wood under the pressure plate so that the cover is free to move down. Punch aligning marks (1, Fig. 4) on the cover and a pressure plate

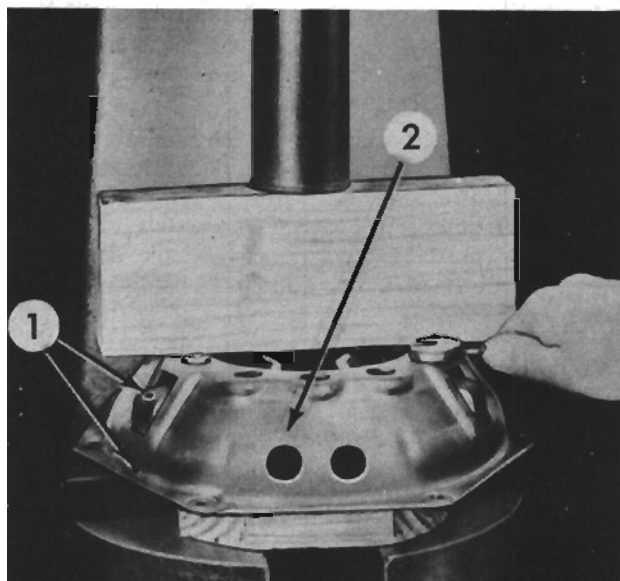


FIG. 4

1. Aligning marks

2. Pressure plate



lug before disassembling the unit. Place a wooden block on the spring bosses across the top of the cover and compress the assembly. Remove the adjusting nuts and release the arbor press slowly to gradually relieve the clutch spring pressure. Remove the pressure plate cover springs. Remove the anti-rattle springs from the cover

To remove the toggle levers, grasp the lever and eyebolt so that the outer end of the lever and the upper end of the eyebolt are as close together as possible. Keeping the eyebolt seated in its socket in the lever, lift the strut over the ridge on the end of the lever and lift the lever and eyebolt from the pressure plate.

### Reassembly—All Models (Except Goldenhawk)

Before reassembling the pressure plate, coat the pressure plate lugs and lever pins with a thin film of Lubriplate.

Assemble the toggle lever, eyebolt, and pin. Insert the strut (4, Fig. 5) in the slots of the pressure plate lug (3), drop it slightly, and tilt the lower edge until it touches the vertical milled surface of the lug. Holding the end of the eyebolt (2) and the end of the lever (1) as close together as possible, insert the unthreaded end of the eyebolt into the hole of the pressure plate, with the short end of the lever under the hook of the pressure plate lug. Then slide the strut (3, Fig. 6) upward in the slots of the lug, lift it over the ridge on the short end of the toggle lever (1), and drop it in the groove of the lever. Assemble all three toggle levers in the same manner.

Using an approved spring tester, test the pressure plate springs for proper tension. It should require 175 lbs.  $\pm$  5 lbs. (79,5 kg.  $\pm$  2,27 kg.) to compress the green springs of the clutch used with the 259 cu. in. engine to a length of 1-11/16" (42,8 mm.). The black springs of the clutch used with the 185 cu. in. engine should require a load of 230 lbs.  $\pm$  7 lbs. (104,5 kg.  $\pm$  3,18 kg.) to compress them to a length of 1 1/2" (38,1 mm.), and the orange springs a load of 170 lbs.  $\pm$  5 lbs. (77,11 kg.  $\pm$  2,27 kg.) to a length of 1 1/2" (38,1 mm.). On the clutch used with the 289 cu. in. engine, it should require a load of 135 lbs.  $\pm$  5 lbs. (61,5 kg.  $\pm$  2,27 kg.) to compress the purple spring to a height of 1-11/16" (42,8 mm.) and a load of 230 lbs.  $\pm$  6 lbs. (104,5 kg.  $\pm$  2,72 kg.) to compress the brown spring to a height of 1-11/16" (42,8 mm.). Springs that do not test to these specifications should be replaced.

Assemble the springs (1, Fig. 7) on the small bosses of the pressure plate (2). The center boss of each group on the Champion and Flighthawk clutch is not used. Install the anti-rattle springs in the cover and place the cover upon the pressure plate and springs. Be sure the punch marks of the cover and the pressure plate lug are aligned and the anti-rattle springs are in position. Then place the assembly on a wooden block

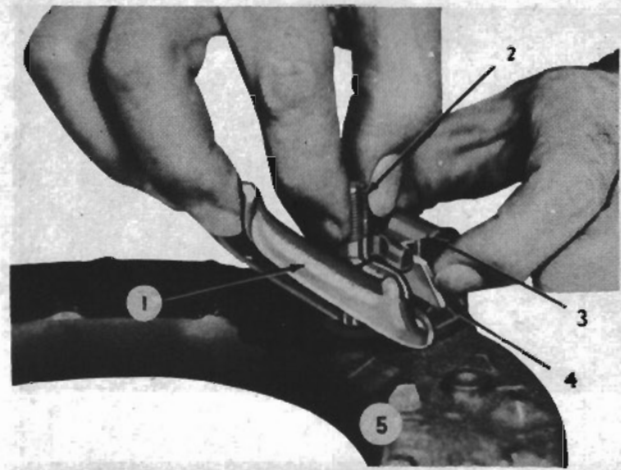


FIG. 5

1. Lever
2. Eyebolt
3. Pressure plate lug

4. Strut
5. Pressure plate



FIG. 6

1. Lever
2. Eyebolt

3. Strut
4. Lug

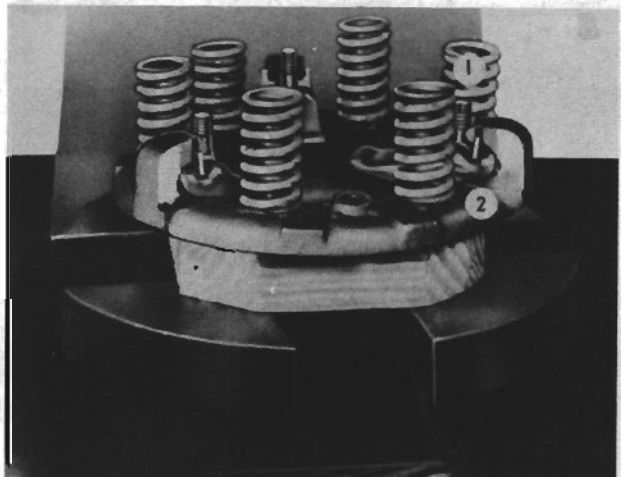


FIG. 7

1. Pressure plate springs

2. Pressure plate



FIG. 8



FIG. 9

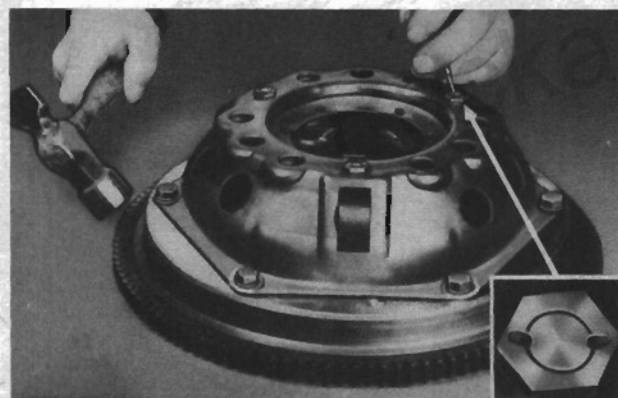


FIG. 10

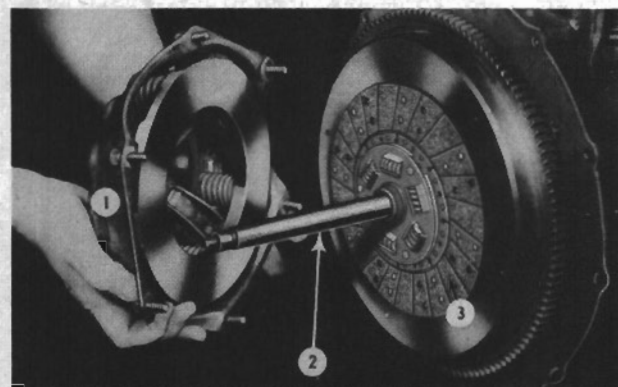


FIG. 11

1. Pressure plate assembly  
2. Aligning gage

3. Driven plate

in an arbor press. Slowly press on the cover, being sure the eyebolts and plate lugs are guided through the proper openings in the cover, and the springs are properly seated. Install the adjusting nuts and screw them down until they are flush with the top of the eyebolts. Then remove from the press.

#### Adjustment—All Models

The toggle levers are carefully set at time of manufacture and normally need not be adjusted. If the pressure plate has been disassembled, use Gage Plate J-4708 to adjust the toggle levers.

The toggle lever adjustment may be made with the engine flywheel either in the car or on the bench. Place the gauge plate (see Fig. 8) on the flywheel in the position normally occupied by the driven member. Place the pressure plate assembly on the flywheel and center the gauge plate so that the three flat machined lands are directly under the levers. Tighten the six cover screws, tightening each screw a turn or two at a time to avoid distortion of the cover when pulling against the pressure of the springs. Depress each toggle lever several times with a hammer handle to settle all parts in their proper positions. Then place the Lever Height Gage (see Fig. 9) on the hub of the gauge plate with the end of the gauge above one of the levers. Turn the lever adjusting nut as required until the lever just contacts the gauge. Use the  $3/16''$  (4.76 mm.) step for the 56G models, the  $1/8''$  (3.18 mm.) step for the 56B models and the  $1/16''$  (1.59 mm.) step for the 56H models. Then adjust the other levers in the same manner. After making the adjustment, stake the nuts to the eyebolts with a pin punch as shown in Fig. 10.

#### Installation—All Models

Install the Clutch Aligning Gauge J-2045 (2, Fig. 11), or suitable transmission pinion shaft, in the pilot bearing. If the gauge is used, make sure that the gauge is centered and locked securely. Place the driven member (3) over the gauge with the long end of the hub away from the flywheel, and fit it tightly against the flywheel. Mount the pressure plate assembly (1) on the flywheel. Tighten the six cover retaining screws to 13 to 15 ft-lbs (1.8 to 2.1 kg-m) torque on models except the Goldenhawk and 25 to 28 ft-lbs (3.5 to 3.9 kg-m) on the Goldenhawk. Tighten each screw in turn a little at a time to avoid distortion of the cover.

Install the clutch housing as outlined in Clutch Housing—Installation.

#### DRIVEN PLATE

##### Reconditioning—All Models

No reconditioning of the driven plate other than replacing the friction facings is recommended. Facing replacement requires extreme care and use of proper tools and riveting equipment.



To remove the old facings, drill out the rivets with a 3/16" (4,763 mm.) diameter drill. Do not punch the rivets out, as this will result in damage and distortion of the driven plate.

To install the friction facing, place the facing on the flywheel side of the driven plate, line up the countersunk holes with the rivet holes in the cushion spring "A" of section "B-B" as illustrated in Figs. 12 and 13 and assemble the facing on the cushion spring which is convex at this point. These holes are in line with the neck of the cushion spring. Insert the rivet head in the counterbore and roll, do not split, the rivet against the cushion spring. Rivet each cushion spring to this facing before installing the other facing.

Turn the driven plate over and line up the countersunk holes of the pressure plate facing with the holes in the cushion spring as illustrated in Section "C-C" of Figs. 12 and 13. Insert a rivet in the counterbore and roll, do not split, the rivet against the cushion spring "A." The rivet holes for this facing are those nearer the edge of the cushion spring. Each rivet goes through only one facing.

During the riveting operation, make sure that the new friction facings are held tightly against the cushion spring. Clutch drag will result from uneven and loose facings due to improper riveting.

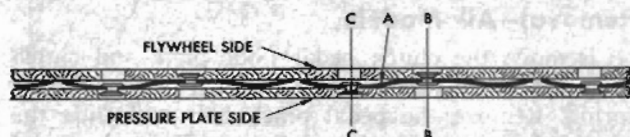


FIG. 12

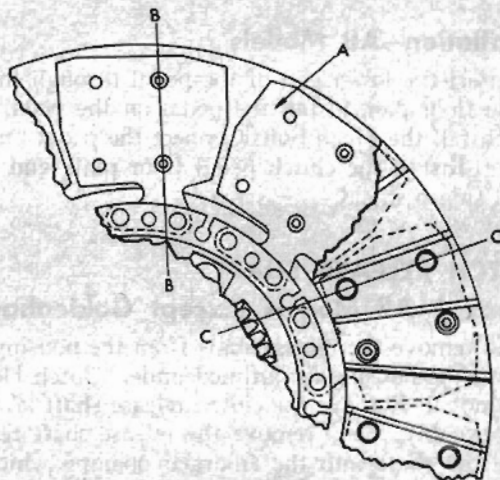


FIG. 13

## CLUTCH LINKAGE

### CLUTCH PEDAL

#### Pedal Travel—All Models

The clutch pedal should have a minimum of 1/2" to 1" (12,70 mm. to 25,50 mm.) free travel on all models except the Goldenhawk, and on the Goldenhawk the free travel should be 1 1/2" (38,1 mm.). This is the distance the pedal moves before the release bearing contacts the clutch release levers and the clutch starts to disengage.

On all models except the Goldenhawk, make the

adjustment, loosen the lock nut (3, Fig. 14) on the rod connecting the clutch release shaft lever to the clutch operating shaft lever and remove the clevis pin. Turn the clevis to shorten or lengthen the rod to decrease or increase the pedal free travel as required. On the Goldenhawk, loosen the lock nut (4, Fig. 15) and turn the nut (3) as required to secure the proper adjustment.

If the car is equipped with a Hill Holder, also adjust the Hill Holder operating rod as outlined in the Brake section.

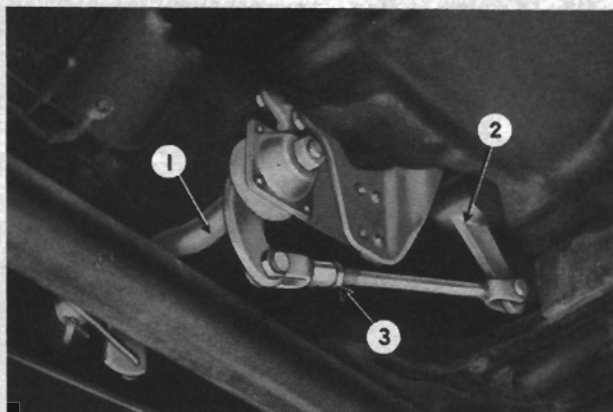


FIG. 14

1. Clutch operating shaft
2. Release shaft

3. Lock nut

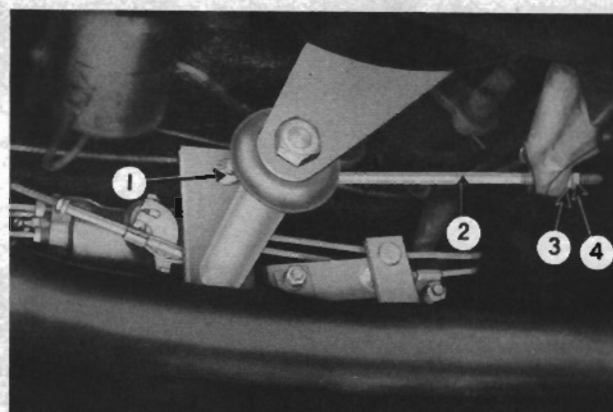


FIG. 15

1. Rod clevis pin
2. Release lever to operating shaft lever rod

3. Adjusting nut
4. Lock nut

**Removal—All Models**

Remove the clutch pedal floor plate and clutch pedal splash shield. Unhook the clutch pedal pullback spring. Remove the pedal pinch bolt and slide the end of the pedal off the pedal shaft. Raise the pedal and thread the pedal up through the hole in the floor pan.

**Installation—All Models**

Insert the lower end of the pedal through the hole in the floor pan, install the pedal on the pedal shaft, and install the pinch bolt. Connect the pedal pullback spring. Install the clutch pedal floor plate and clutch pedal splash shield.

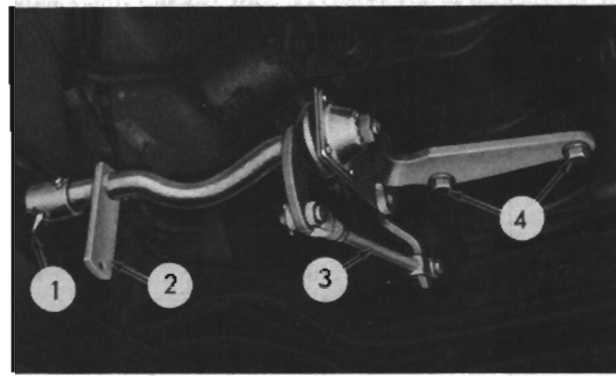


FIG. 16

- |                          |                        |
|--------------------------|------------------------|
| 1. Clevis pin            | 3. Lock nut            |
| 2. Operating shaft lever | 4. Release shaft lever |

**CLUTCH RELEASE SHAFT****Removal—All Models (Except Goldenhawk)**

To remove the release shaft from the housing, first remove the housing as outlined under Clutch Housing—Removal. Remove the clutch release shaft lever and rod assembly. Then remove the release shaft retainer, move the shaft into the enlarged opening which was left by the removal of the shaft retainer, and bring the other end of the shaft out of the bushing at the right side of the housing. Turn the shaft as required to remove it from the housing.

**Installation—All Models (Except Goldenhawk)**

Before installation of the release shaft, fill the grease retainer at the right side of the housing approximately one-third full of high melting point grease.

To install the release shaft, insert the end of the shaft which has the hole through the opening of the housing and into the hole on the left side of the housing as far as possible. Swing the other end of the shaft inward; then move the shaft to the right and insert the end of the shaft into the bushing on the right side of the housing. Install the release shaft retainer. Install

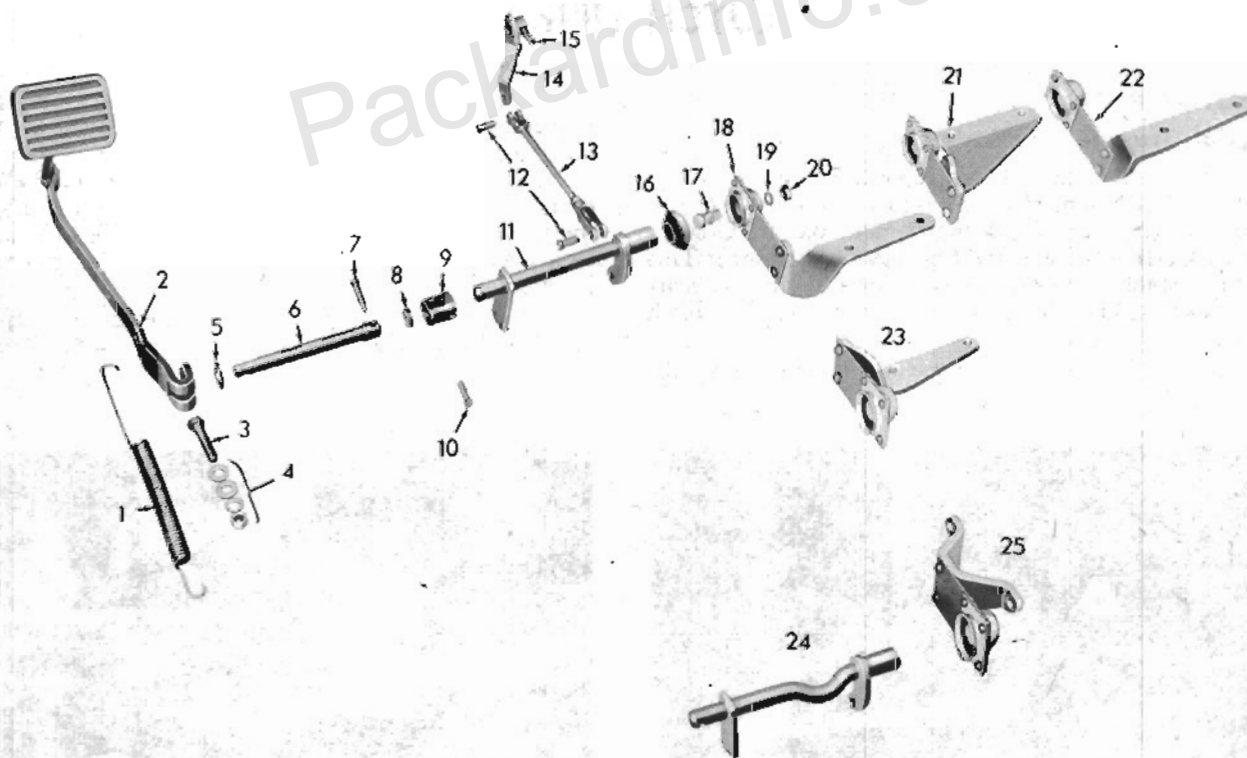


FIG. 17

- |                     |                              |   |   |
|---------------------|------------------------------|---|---|
| 1. Pullback spring  | 8. Rubber washer             | 15. Lever pin                             | 21. Support bracket—Commander and President W, F, D |
| 2. Clutch pedal     | 9. Sleeve                    | 16. Rubber boat                           | 22. Support bracket—Flighthawk                      |
| 3. Pedal bolt       | 10. Pin                      | 17. Ball stud                             | 23. Support bracket—Champion                        |
| 4. Washers and nut  | 11. Shaft—except President Y | 18. Support bracket—Powerhawk and Skyhawk | 24. Shaft—President Y                               |
| 5. Washer           | 12. Clevis pin               | 19. Lock washer                           | 25. Bracket—President Y                             |
| 6. Pedal shaft      | 13. Rod                      | 20. Nut                                   |   |
| 7. Taper sleeve pin | 14. Release shaft lever      |   |   |



the clutch release shaft lever and rod assembly. Install the housing as outlined under Clutch Housing—Installation.

### CLUTCH OPERATING SHAFT

On all models except the Goldenhawk, the outer end of the clutch operating shaft is connected to the pedal shaft by a sleeve. The shafts are attached to the sleeve by means of pins. The inner end of the operating shaft is hollow and is supported by a ball stud. The stud is held securely in the support bracket assembly which is mounted on the bottom of the transmission case.

On the Goldenhawk, the operating shaft is supported at the transmission and at the frame side rail by ball studs. The lever at the inner end of the shaft is connected to the clutch release bearing bracket by the adjusting rod. Links connect the lever at the outer end of the shaft to the pedal shaft lever (see Fig. 18).

### Removal and Disassembly— All Models (Except Goldenhawk)

Disconnect the clutch pedal free travel adjusting rod (3, Fig. 16) at the operating shaft inner lever. If equipped with a Hill Holder, disconnect the Hill Holder operating rod from the operating shaft outer lever (2). Remove the operating shaft sleeve pin (1). Remove the support bracket cap screws (4). Lower the support bracket, slip the operating shaft sleeve off the pedal shaft, and remove the assembly.

Slip the shaft off the ball stud and out of the rubber boot (16, Fig. 17). Remove the boot. If necessary to replace the ball stud (17), remove the nut (20) and lock washer (19) and slip the stud out of the bracket assembly.

### Reassembly and Installation— All Models (Except Goldenhawk)

If the sleeve has been removed from the shaft, install the sleeve on the shaft, making sure that the retaining pin is held securely with a cotter key. Install the rubber insulating washer (8) in the sleeve and seat it against the end of the operating shaft. Slip the sleeve over the end of the pedal shaft, align the holes, and install the tapered retaining pin. Install the cotter key. Pack the inner end of the shaft approximately one-half full of a high melting point grease. Install the rubber boot on the support bracket. Slip the rubber boot over the end of the shaft and start the ball stud into the end of the shaft. Align the mounting holes of the bracket and transmission and install the retaining cap screws. Connect the adjusting rod to the inner lever. If equipped with a Hill Holder, connect the Hill Holder operating rod to the outer lever.

### Removal and Disassembly—Goldenhawk

Disconnect the clutch adjusting rod clevis pin (see Fig. 18) and slip the clevis off the operating shaft lever. Loosen the link upper bolt and remove the link bolt which connects the links to the lever of the operating shaft and slip the links off the lever. Remove the retainers and spacer from the lever. Remove the

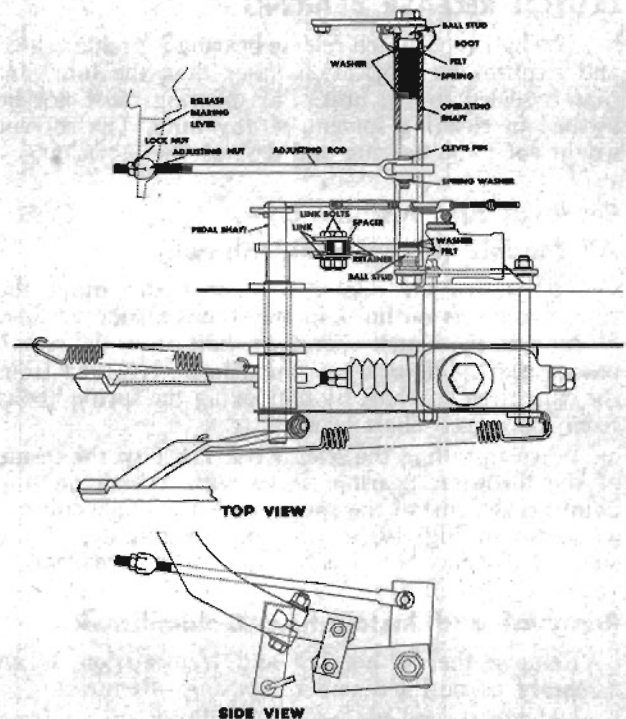


FIG. 18

operating shaft bracket-to-transmission screws. Swing the bracket down to clear the transmission and slip the opposite end of the shaft off the ball stud. Remove the O-ring seal from the ball stud. Remove the felt and washer from within the end of the shaft. Then, slide the bracket ball stud and boot assembly off the inner end of the shaft. Remove the felt, spring and two washers from within the shaft. Lift the boot off the retainer. Removal of the ball stud nut permits removal of the stud and boot retainer.

### Reassembly and Installation—Goldenhawk

Reassemble the ball stud, boot retainer, and boot on the operating shaft bracket. Insert one of the washers and spring in the inner end of the shaft and place the other washer and felt on the end of the spring. Pack the opening approximately one-third full of Lubriplate or a high melting point grease. Slip the boot over the end of the shaft and insert the ball stud in the shaft. Install an O-ring seal on the ball stud at the frame. Insert the washer and spring in the other end of the shaft, pack small amount of Lubriplate or high melting point grease in the end of the shaft and slip the shaft over the ball stud. Swing the bracket into position on the transmission and install the retaining cap screws. Apply Lubriplate to the link spacer and insert the spacer in the link. Position the lever between the links, place a retainer between each link and lever. Align the links, retainers and lever and install the retaining bolt. Tighten both bolts securely. Install the clutch adjusting rod on the operating shaft lever.

## CLUTCH RELEASE BEARING

The ball-type clutch release bearing is prelubricated and requires no lubrication other than the lubricant that is sealed in the unit. This bearing must not be washed in cleaning solvent of any kind. The solvent would enter the bearing and destroy the lubricant.

### Removal and Installation—

#### All Models (Except Goldenhawk)

To remove the release bearing, first remove the transmission as outlined in the Transmission section. Disconnect the clutch operating shaft from the clutch release shaft. The bearing can then be removed from the clutch release shaft by unhooking the spring hooks from the release shaft levers.

When installing the release bearing, coat the inside of the throwout bearing sleeve with a high melting point grease. Install the spring with the single coil up, as shown in Fig. 19, to prevent any binding of the collar and reduce the possibility of spring breakage.

### Removal and Installation—Goldenhawk

Remove the bellhousing and transmission as an assembly as outlined under Housing—Removal.

Unhook the release bearing pullback spring from the release bearing and slip the bearing off the transmission front flange.

Apply grease to the bore of the release bearing sleeve and slip the bearing on the transmission flange.

Install the housing and transmission assembly. Connect the pullback spring.

## PILOT BEARING

### Removal and Installation—

#### All Models (Except Goldenhawk)

To remove the clutch pilot bearing, first remove the transmission as outlined in the Transmission section. Then remove the clutch assembly as outlined under Clutch—Removal.

On Champion and Flighthawk models, the pilot bearing is pressed into the flywheel. If a suitable puller is not available, the flywheel can be removed and the bushing driven out with a brass drift.

On Commander, President, Powerhawk, and Skyhawk models, the pilot bearing is pressed into a blind hole in the end of the crankshaft. If a suitable puller

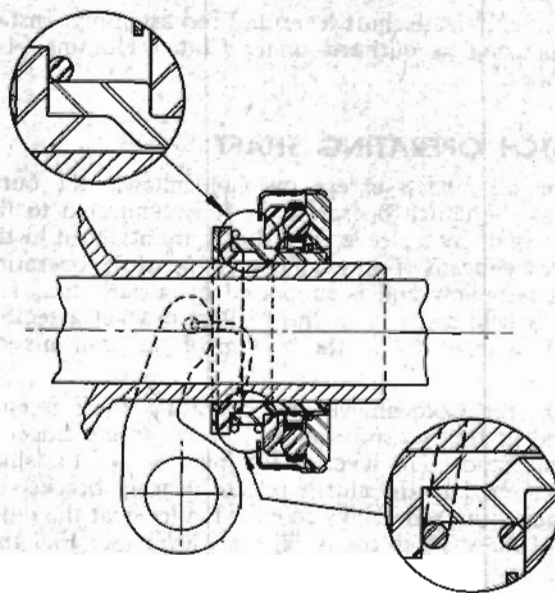


FIG. 19

is not available, break the bushing with a sharp screw driver, being careful not to damage the bore in the crankshaft. Clean the bore carefully before installing a new bushing.

Use the J-2157 Replacer to install the new bearing.

Install the clutch pressure plate assembly and driven plate. Install the transmission.

### Removal and Installation—Goldenhawk

Remove the bellhousing and transmission as an assembly as outlined under Housing—Removal. Remove the clutch pressure plate assembly and driven plate. Then, remove the pilot bearing by using Tool J-489.

Pack the pilot bearing with short fiber wheel bearing lubricant and install the pilot bearing with the open side toward the front of the engine (shielded side toward the rear).

## TORQUE CONVERTER

Servicing, removal, and installation procedures of the torque converter are discussed under Automatic Drive in the Transmission section.

## DIAGNOSIS

### CLUTCH SLIPPING

#### CAUSES

1. Insufficient or no clutch pedal lash.
2. Clutch release shaft tight in housing.
3. Weak or broken clutch pressure springs.
4. Grease or oil on clutch friction facings.
5. Badly worn or burned friction facings.
6. Friction facings improperly installed on clutch driven plate.
7. Incorrect type of friction facings.
8. Clutch toggle levers improperly adjusted.
9. Incorrect assembly of clutch parts.





